

AMS Tracker
Thermal Control
Subsystem

TTCB FM Vibration test procedure

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Issue 3.0
Date May 14 2009

Step	Action	Monitoring	Value	Result	Comment
	Fill in by hand.				
40.	Cable harness	heaters	DS18s20	✓	
41.	Take pictures of TTCB from all sides	Chafing/mounting		✓	
42.	End of second axis vibration			✓	
43.	Third Axis Vibration test				
44.	Install the TTCB on the vibration table in third axis direction			✓	<p>Rotate 90° the plate (without unscrewing the bolt between box and fixture) to perform the second axis</p> <p>Fasten non-flight bolts</p>

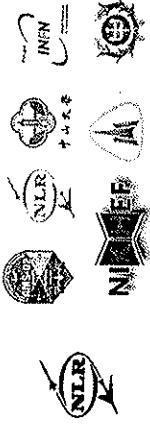


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Step	Action	Monitoring	Value	Result	Comment
45.	Install accelerometers (if needed)				
46.	Install the accelerometer to the Vibration I/F plate (figure 4.4)	Type/location		✓	Indicate location/orientation change
47.	Perform visual inspection prior to test			✓	
48.	Visual inspection, unaided eye, look at outer surface for - scratches - dents - cleanliness	scratches Dents Particles/grease		✓	
49.	Look inside box for -Loose particles due to shaving -Loose cables/harnesses -Loose bolts/nuts -Loose shaving protection of rivnuts				
50.	Attachment of glued components	PT1000 heaters DS18s20			
51.	Cable harness	Chafing/mounting			

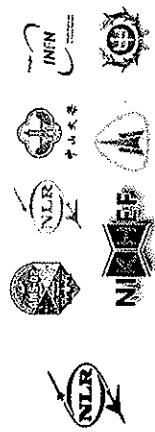


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Step	Action	Monitoring	Value	Result	Comment	Location:	Date:
TTCB Vibration test sheets							
	Fill in by hand.						
S2.	Take pictures of TTCB from all sides						
53.	Perform one PRE sine sweep from 5 to 1000 Hz 0,2 G – scan rate 1 oct/min	Check loose parts		✓		If any loose parts are detected stop test	
54.	Check that the frequencies of the mechanics are well above 50Hz Document "response" curves			✓			
55.	Document the last characterisation "response curve"			✓			
56.	Perform Random Vibration test third axis according to spectrum in Appendix A.			✓			
57.	Perform one POST sine sweep from 5 to 1000 Hz 0,2 G – scan rate 1 oct/min			✓			
58.	Check that the frequencies of the mechanics are well above 50Hz Document "response" curves			✓			
59.	Document the last characterisation "response curve"			✓	file name		
60.	Perform visual inspection after test			✓			
61.	Visual inspection, unaided eye, look at outer surface for - scratches			✓			



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Step	Action	Monitoring	Value	Result	Comment
	TTCB Vibration test sheets				date: 2009 - 05 - 25
	Fill in by hand.				location: SEMS
62.	- dents - cleanliness	Dents Particles/grease	/	/	
63.	Look inside box for -Loose particles due to shaving -Loose cables/harnesses -Loose bolts/nuts -Loose shaving protection of rivnuts		/	/	
64.	Attachment of glued components	PT1000 heaters DS18s20	/	/	
65.	Cable harness	Chafing/mounting		/	
66.	Take pictures of TTCB from all sides			/	
	End of third axis vibration				



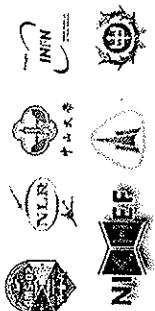
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7.3 TTCB vibration post-test procedure sheets

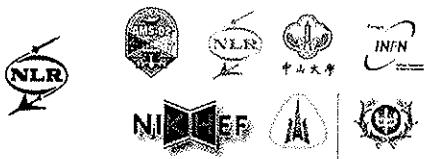
Step	Action	Monitoring	Value	Result	Comment	location:	date:
1.	Record model type		P / S				✓
2.	Check temperature monitoring during testing has been performed according to appendix B.						
3.	Perform functional test according to AMSTR-NLR-PR-028				See separate procedure		
4.	Perform venting of the vibration test loop according to AMSTR-SYSU-PR-024 FM TTCB Filling and venting procedure						
5.	End of sheet						



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Appendix A: Vibration profiles and levels

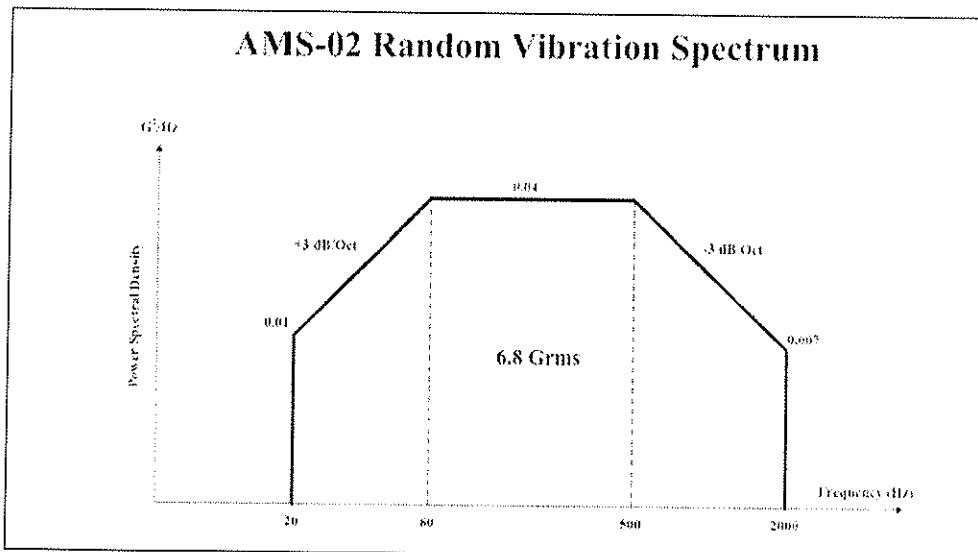
The TTCB's are subjected to Minimum Workmanship Level Vibration testing. The requirements are as follows.

Table 15-2: Minimum Workmanship Levels for the Alpha Magnetic Spectrometer - 02

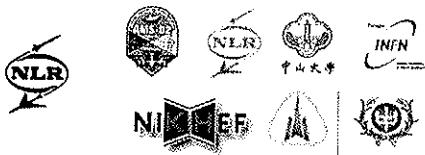
All Axes	20 Hz	0.01 g ² /Hz
	20-80 Hz	+3 dB/Octave
	80-500 Hz	0.04 g ² /Hz
	500-2000 Hz	-3 dB/Octave
	2000 Hz	0.01 g ² /Hz
	Overall = 6.8 Grms	

Note: MWL Test duration: 60 seconds per axis

The profile is shown in the below figure.



AMS02 TTCB random vibration spectrum



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Before and after each axis random vibration test a sine sweep is performed to characterise to characterize the TTCB response curves. The Sine sweep definition is as follows.

Sine sweep from 5 to 1000 Hz – 0,2G – scan rate 1 oct/min



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Appendix B: Temperature fill table during vibration test

(Will be used as reference to show to NASA $P_{TTCB} < MDP$ (160 bar))
Max allowed temperature

Temperature monitoring during Vibration testing

Write down max allowed Temperature (based on filling): 62 [°C]

Fill every 15 minutes

(In case the maximum allowed temperature is almost reached fill every 5 minutes)



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Temperature monitoring during Vibration testing

Write down max allowed Temperature (based on filling):.....[°C]

Fill every 15 minutes

(In case the maximum allowed temperature is almost reached fill every 5 minutes)

ANSTR-NLR-PP Secondary box during vibration

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Temperature log. Max T allowed = 62 °C

T_{max}, during test = 29.1 °C \Rightarrow P_{syst} << 160 bar.
P_{ext} = 75 bar.

23/5/2009

Time TT C1

TTCB-S at 2 of climate chn.
cool, warmed or during the night

Time Tacee Tcover

9 ⁰⁶	20.9	23.7
9 ⁵³	21.6	24.6
10 ⁰⁰	22.3	24.4
10 ¹⁷	24.0	25.9
10 ²⁵	24.3	26.3
10 ²⁵	24.8	26.9
10 ³⁶	25.3	27.3
10 ⁵⁸	25.8	27.6
10 ⁵⁸	26.0	
11 ⁰¹	25.7	27.4
11 ⁰³	25.5	26.9
11 ¹⁹	24.6	24.9

are ship table

11 ⁴⁸	26.3	24.8
12 ⁰⁵	24.2	24.8
12 ³⁰	24.3	24.6
12 ⁵⁷	24.8	25.1 X-axis sine
13 ²⁵	26.0	26.2
14 ⁰⁰	27.5	29.1

horizontal tube (4mm) need more damping
parallel to COM soft even damping
w/1h PTEO block?
15⁰⁰ 27.5 28.2 sine sweep